Electrode and photoelectrochemical cell with four layers, method for producing a printable paste containing an electrolyte and/or carbon, and electrode

Patent claims

1. Procedures for manufacturing an electrolyte containing and/or carbon containing printable paste, in particular as electrode material for a photoelectrochemical cell, with the steps:

   a) preparing a solvent containing electrolytic salts and/or an electrolytic auxiliary;
   b) adding carbon black, e. g. with a large surface and/or a conductive carbon black and/or graphite, e. g. with a very weak electrical resistance, so as to produce a suspension;
   c) stirring the solvent containing the carbon black and/or graphite to produce a substantially homogeneous suspension;
   d) treating the homogenized suspension with ultrasound to produce a thick, printable paste

2. Procedures according to patent claim 1, characterized by the fact that in the solvent the electrolyte salts and the electrolyte auxiliary do exist in a concentration in each case, as it is used for an electrolyte in a photoelectrochemical cell, while as solvent preferentially y-Butyrolactone is used, to which are preferably added 10 weight % of carbon black with a large surface of 20 m^2/g or over and/or conductivity carbon black with an electrical resistance of max. $10^{-4}\,\Omega$ as well as 8 weight % of graphite with an electrical resistance of max. $10^{-4}\,\Omega$ and the received suspension is stirred for 5 minutes and then treated for 15 minutes with ultrasound.

3. Procedures for manufacturing an electrode, in particular an electrolyte containing electrode of a photoelectrochemical cell, which cover the following steps:

   a) preparing an electrolyte and/or carbon containing printable paste, in particular a paste, which is manufactured in a procedure according to the claims 1 to 2;
   b) applying and pressing the paste on a substrate or a substrate network, in particular on a, an electrode and at least one light absorbing layer containing, substrate network for a photoelectrochemical cell.
   c) applying a graphite layer to the paste, preferably by dusting.

4. Procedures according to the claim 3, characterized by the fact that the paste is pressed with a material covered stamp on the substrate or the substrate network,

characterized by the facts that the substrate or the substrate network consists of a light reflecting electrical isolation layer of TiO_2 or that the electrical isolating properties of the substrate or substrate network are increased additionally by layers of cloth, paper or plastic foils.

5. Electrode arrangement in accordance with the claims 3 to 4, in particular an electrolyte containing counterelectrode arrangement of a photoelectrochemical cell, characterized by the fact that it comprises an electrolyte containing and/or a carbon containing printable paste, in particular manufactured in a procedure in accordance with one of the claims 1 to 2, which is characterized by the fact that it has a layer thickness from 10 to 100 µm, preferably a thickness of 20 µm.

6. Photoelectrochemical cell, which comprises:

a) an electrode,
b) a diaphragm as isolation layer
c) an electrolyte containing counterelectrode,
d) one with a dye layer sensitized light absorbing layer,

characterized by the fact that in the procedures mentioned in the claims 3 to 5 the counterelectrode and the electrolyte are realized in an integral manner and do consist of a layer (30) of a electrolyte and/or carbon containing printable paste, in particular a paste, which is manufactured according to one of the procedures mentioned in the claims 1 to 2.

7. Photoelectrochemical cell according to the claim 6, characterized by the fact that the electrolyte containing counterelectrode (30) contains a graphite layer, in particular a dusted graphite layer (31).

8. Photoelectrochemical cell according to the claims 6 or 7, characterized by the fact that the electrode (10) and/or the electrolyte containing counterelectrode (30, 31) are covered with an electrically conductive layer, metal, ITO or a conductive glass (10, 20) and that at least one of the electrically conductive layers (10, 20) is covered with an electrical insulating layer (60, 70) for which an isolating glass, an isolating plastic or other organic or inorganic materials are used.

9. Photoelectrochemical cell according to the claims 6 to 8, characterized by the fact that as dye for the light absorbing layer (40) a sensitizing dye layer (50) is used.

10. Module consisting of photoelectrochemical cells or other products which contain an electrolyte and/or a carbon containing printable paste, which was manufactured in a procedure according to the claims 1 to 2.

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